Mercury Clean Up Techniques and Case Studies

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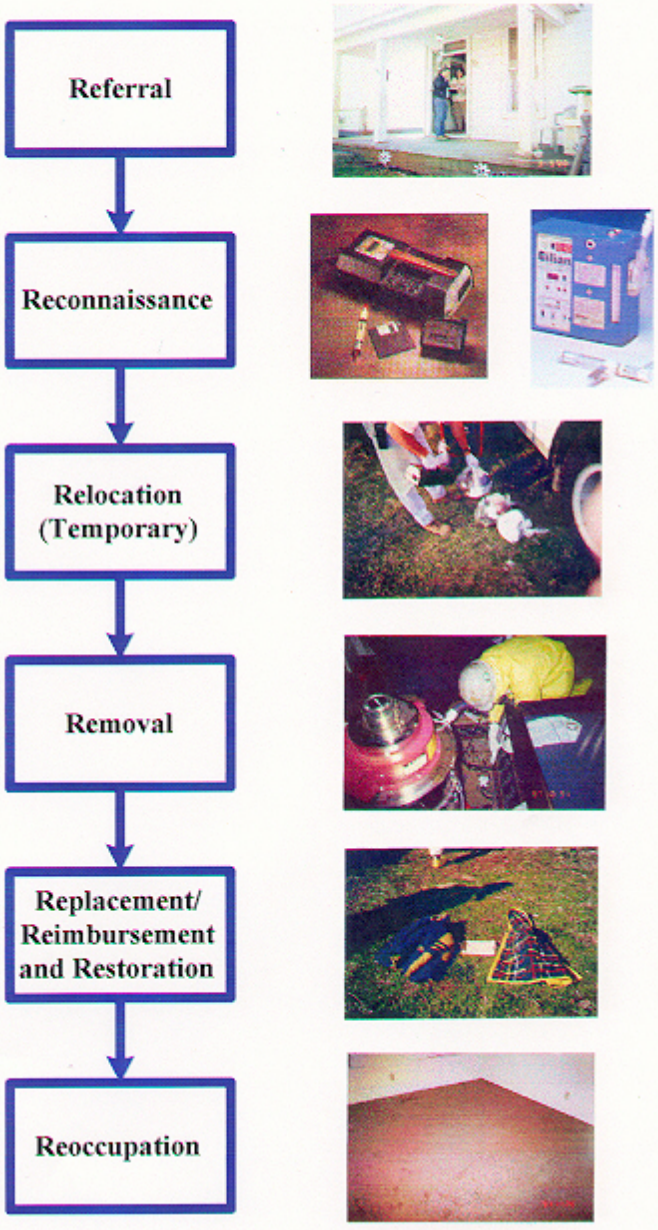
Agenda:

- General Removal Guidelines
- Risk-based Clean-up Criteria
- Disposal Criteria
- Removal Specifics *** Focus on residential clean-ups
- Case Studies

The Six "R's" of a Residential Mercury Response



General Removal Guidelines

- Identify contaminated areas.
- Collect visible mercury.
- Assess and/or remove porous items.
- Treatment of porous items.
- Assessment of appliances.
- Decontamination of non-porous items.
- Ventilate impacted areas.
- Re-screen and re-assess.
- Stabilization and sampling.

Risk-Based Clean-up Criteria

Indoor Air Concentration (ug/m^3)	Use of Action Level	Method of Analysis
≤ 1	Residential occupancy level	NIOSH 6009 or equivalent
10	Immediate evacuation	Real-time air monitoring
10	Acceptable level for return of personal belongings	Real-time air monitoring
3	Commercial setting where mercury is not handled	NIOSH 6009 or equivalent
25 / 50 / 100 / 1000	TLV / REL / PEL / IDLH	Real-time air monitoring

* Risk based number have changed often.

Disposal Criteria:

Disposal Criteria	Concentration
Recycling / retorting	N/A
Land-Ban	260 mg/kg
RCRA Hazardous Waste	0.2 mg/L TCLP
Underlying Hazardous Constituent	0.025 mg/L TCLP
Soil clean-up level / residential (Ohio)	16 mg/kg

Removal Specifics

Identify Contaminated Areas

*Interview all involved parties prior to entry.

Visual Identification

Air Screening

Collect Visible Mercury

Mercury Vacuum

Collect Visible Mercury

Mercury Spill Kit

Alternative Methods

-Pipette

-Duct Tape

-Shaving Cream

-Paper Cones

Assess and/or Remove Porous Items

- Evaluate large impacted porous items.
  - Carpet, mattresses, furniture,wood molding, concrete.
  - Substantial increases above ambient conditions warrants treatment or removal.

- Evaluate small impacted porous items.
  - Place in plastic bags.
  - Remove from structure.
  - Screen and evaluate (10 ug/m^3).

Treatment of Porous Items

- Carpet and Mattresses.
  - Remove if concentration is substantially above ambient.
- Molding, Tile, Concrete, Drywall, Furniture.
  - Attempt to decontaminate (vacuum and decon solution).
  - Heat and vent treatment.
  - Seal (last resort).
- Personal Belongings (clothing, shoes, linens, etc.).
  - Ventilate outdoor (ideally, in warm climate).
  - Bag and screen.
  - If above 10 ug/m3, dispose.
  - If below 10 ug/m3, re-ventilate and return.

Assessment of Appliances

- Washer and Dryer.
  - Screen.
  - Remove and ventilate any clothing.
  - If less than 10 ug/m^3, run empty cycles.
- Vacuum.
  - Screen and assess each section.
  - Remove any porous materials.
  - Decontaminate non-porous sections or dispose (Common Cleansers).

Decontamination of Non-Porous Items

- Wash impacted areas/items with mercury vapor suppression solution.
  - Sulfur-based compounds are corrosive.
  - Allow for appropriate reaction time.
- Clean water wipe down.
- Re-screen.

Ventilation of Impacted Areas

- Isolate non-impacted areas.
  - Screening indicates no mercury concentrations in air.
- Set up cross ventilation in impacted areas.
  - High volume fans, box fans, etc.
  - Vent in from non-impacted areas.
- Allow to ventilate for approximately 24 hours at increased temperature.

* Consult appropriate agency prior to ventilation.

Re-screen and Re-assess

- Screen both impacted and non-impacted areas.
- If screening is above action level, a source likely exists in the structure.
  - Use low-level intensive screening techniques to identify source areas.
  - Decontaminate or remove identified source.
  - Repeat ventilation.
- If screening is just below the action level, consider heat/vent techniques.
- If screening is well below the action level, stabilize conditions and sample.

Stabilization and Sampling

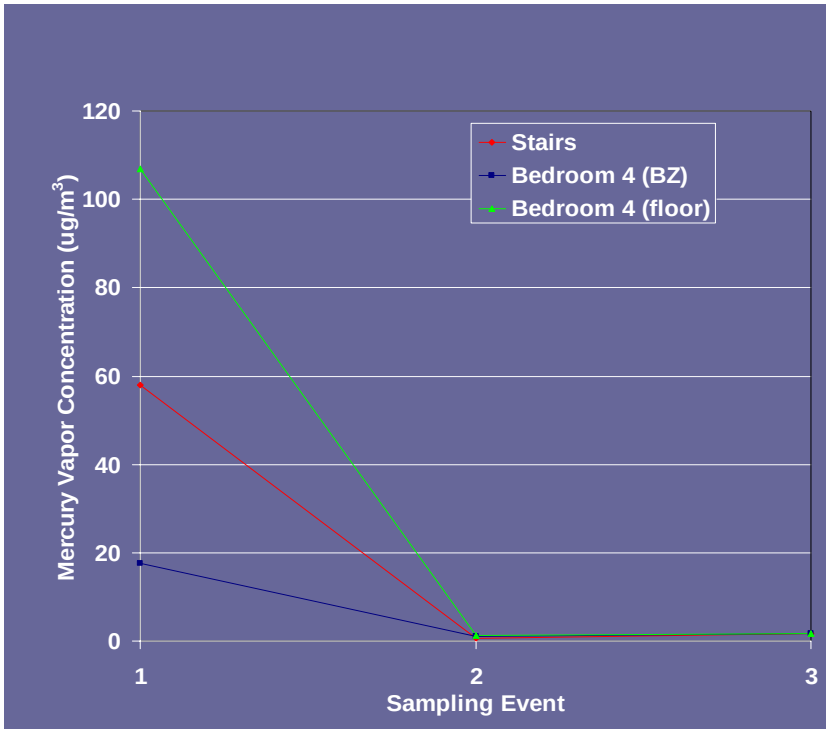
- Stabilization Conditions.
  - Seal off impacted areas.
  - Raise to room temperature.
  - Allow conditions to equilibrate over 4 to 8 hours.
- Sampling.
  - NIOSH Method 6009 or equivalent (8 hour).
  - Collect from breathing zone from impacted areas.

Case Studies

- Designed to show the differences on various clean-ups.
  - Notification.
  - Extent of contamination.
  - Tracking.
  - Clean-up techniques.
  - Difficulties encountered.
  - Costs.

Case Study: Centreville Mercury Spill

- Mercury spill identified by doctor assessing sick child.
- Foster home.
- No visible mercury evident.
- Screening and sampling used to identify likely source area.
  - Levels > 100 ug/m^3.
- After removing all items from impacted room, level drop to less than 2 ug/m^3.
- Used “old” screening techniques.
- Clean-up cost: $ 30,000.



Case Study: Lorain County Mercury Spill

- Potentially tracked to 48 homes, 8 schools, and 5 school vehicles.
- One house, 3 vehicles, and the chemistry lab required removal actions.
- Student stole mercury from school chemistry lab.
- Other house showed slightly elevated levels.
- Response lasted 5 days.
- High profile.
  - Media circus.
  - Angry citizens.
  - Set off wave of mercury calls.
    - Over 10 calls from concerned citizens since spill first happened in March.
- Response cost:
  - $13,000 for clean-up.
  - $15,000 for technical assistance.

Case Study: Hawthorne Avenue Spill

- Child breaks thermometer in living room.
- Parent notifies 911.
- Fire Department responds.
  - Appropriate response until they utilized resident's vacuum to collect residual mercury.
- Increased breathing zone levels throughout house.
- Additional source identified and removed.
  - 6 inch by 3 inch strip of carpet.
  - Ventilated couch cushion.
  - Decontaminated vacuum cleaner.
- Ventilated house for a number of days.
- Clean-up cost: $1,000.

Case Study: Laird Avenue Spill

- Site referred by local health department.
- Beads of mercury present on broken dryer in basement.
- No mercury vapors present on livable floors of the house.
- Mercury recovered from dryer.
- Screening indicated additional source on concrete floor.
- Clean-up Cost: Pending.

Case Study: Sage Avenue Spill

- Son notified parent that his brother had been playing with mercury.
- Source was secured immediately by first responders.
  - 0.25 pounds spilled
- Entire house was screened.
- Impacted area sealed off from rest of house.
- Family permitted to remain in house until clean-up occurred.
- Minimal clean-up required.
- Clean-up cost: < $5,000.

Case Study: Ginger Avenue Spill

- Up to 15 pounds of mercury spilled in garage.
- Air conditioner draws air from garage.
- Following visible source removal, continued high vapors.
- Overnight ventilation required prior to continued source identification.
- Dry mercury vapor suppressant application.
- Clean-up cost: $10,000 (est.).

Case Study: Lincoln Park Site

- Smelting operation in basement of home.
  - Recovering silver from dental amalgam.
  - Next to furnace.
- Four adults hospitalized and died.
- House decon failed.
  - Recovered 78 pounds from vapor recovery system.
  - Spent over $200,000.
  - County demolished house.

Case Study: Springfield Mercury

- Teenagers found over 100 pounds of mercury in and abandoned facility.
- Mercury was distributed among friends
- 16 homes were contaminated
- The 6 “R’s” model was developed
- All 16 homes were deconned in less than 1 month.
- Media fiasco.
- Cost: > $200,000

Questions ???